Cardiovascular Sciences (CVS) IRG [Roster]

Overall Description

The Cardiovascular Sciences (CVS) IRG will consider research applications that employ basic investigations, translational approaches and patient-oriented studies to focus on the development, physiology, and pathophysiology of the heart and circulatory systems. Study Sections are organized around themes of development, muscle contraction including cardiac hypertrophy and failure, cardiovascular electrophysiology and arrhythmias, myocardial ischemia and infarction, vascular hemodynamics and hypertension, neural and integrative, systems physiology, inflammation and atherosclerosis, and vascular cell and molecular biology. Investigators may employ a range of approaches that include genetics, genomics and proteomics, molecular, cell, and computational biology, biochemistry, biophysics and bioengineering, imaging, analyses of model organisms, and human studies.

Study Sections in the CVS IRG include:

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Cardiovascular Differentiation and Development (CDD)

The Cardiovascular Differentiation and Development (CDD) Study Section reviews applications concerning normal and abnormal development and differentiation of the heart, vascular and lymphatic systems. This focus includes stem and progenitor cells, tissue interactions, morphogenetic processes, and regulation of differentiation in humans and model organisms.

Specific areas covered by CDD:

- Cardiac development, including commitment and differentiation of cell phenotypes, cardiac lineages, cardiac transcription factors and their coactivators or repressors, developmental regulation of RNA splicing and developmental changes in protein isoform expression.
- Cardiac morphogenesis, including looping morphogenesis, chamber specification, positional information as it relates to the developing heart, valve morphogenesis and changes in cell number, shape or survival in the context of heart formation.
- Development and differentiation of the conduction system in the heart.
- Neural crest contributions to the heart and great vessels in developing organisms.
- Vascular development, including the origin, commitment and differentiation of endothelial and smooth muscle cell populations. Cell-cell and tissue interactions that regulate vasculogenesis and angiogenesis, cell polarity and organization. Inductive stimuli that regulate differentiation and gene expression. Patterning components that regulate the position, size and organization of the vascular system. Aspects of smooth muscle that include different embryonic origins and divergent physiological responses based on origins.
- Development of the coronary circulation and the epicardium.
- Vascular remodeling in the postnatal organism where angiogenic stimuli produce new outgrowth and vascularization in a recapitulation of embryonic and fetal processes.
- Studies of lymphangiogenesis including the origins, commitment, differentiation and organization of the lymphatic vascular system. This does not include components of the immune system found in the lymphatic drainage system.
- Embryonic cell processes including migration, chemotaxis, cell-cell adhesion, extracellular matrix adhesion, secretion or modification, organization of the cytoskeleton or sarcomere and apoptosis will be covered as they are related to development and differentiation of the cardiovascular system.
- Receptors, signaling, gene regulation and protein expression as related to the differentiation and development of the embryonic and fetal cardiovascular systems.
- Stem cell biology related to the cardiovascular system including differentiation of embryonic and adult stem cells into cardiomyocytes, endothelium, smooth muscle and other components of the cardiovascular system. Characterization of endogenous stem cells that contribute to the myocardium and vasculature *in vivo*. Genetic and pharmacologic enhancements to stem cells to promote their accessibility, function or usefulness.
- Studies of cardiovascular development in a variety of model organisms, including Drosophila, Xenopus, zebrafish, chick and mouse.

- Studies related to the understanding of human congenital cardiac and vascular malformations, including valvular and septal defects, chamber malformations, maternal-fetal vascular connections, teratologic mechanisms, and fetal cardiac pathology.

- Genomic and proteomic approaches to cardiovascular development including expression profiling, mapping of protein interaction networks, saturation mutagenesis and high throughput phenotyping, and the functional evaluation of changes in normal and abnormal development.

- Human genetics of cardiac and vascular malformations, including positional cloning, structure-function and genotype-phenotype correlations, and the modeling of human cardiovascular disorders in other organisms.

Shared Interests Within the CVS IRG:

There is a shared interest in cell biology, signaling and extracellular matrix with other Study Sections in this IRG. Specific overlaps may occur with Cardiac Contractility, Hypertrophy and Failure Study Section in myocardial tissue organization, Electrical Signaling, Ion Transport and Arrhythmias Study Section in the conduction system and Vascular Cell and Molecular Biology Study Section in vascular tissue organization. Assignment of applications to CDD will be on the basis of a central focus on developmental mechanisms in the formation of phenotypes and structures. Studies relevant to congenital cardiovascular disease in humans or animal models that relate to developmental mechanisms should be directed to this Study Section. Translational and applied studies of stem cells and angiogenesis may be referred to disease oriented Study Sections as appropriate.

Shared Interests Outside of the CVS IRG:

- IRG 2 (Molecular Approaches to Gene Function) and IRG 3 (Molecular Approaches to Cell Function and Interactions): shared interest should be resolved towards CDD where cellular and molecular examination of developing cardiovascular tissues necessitate an understanding of the unique aspects of the biology and physiology of the cardiovascular system.

- IRG 5 (Biology of Development and Aging): where the specific biology and physiology of the cardiovascular system is a critical issue to the understanding of developmental processes, applications should be directed to CDD. Studies where cardiac markers or phenotype are utilized secondarily as markers of axis formation or mesodermal differentiation may also be directed to Biology of Development and Aging IRG.

- IRG 5 (Biology of Development and Aging): shared interest exists for studies of apoptosis and cell cycle in the developing heart. These should be directed to CDD where the predominant emphasis is on cardiac or vascular development, especially where related to cardiac malformations. Studies should be directed to Biology of Development and Aging IRG where the studies focus on common developmental processes or other organ systems.

- IRG 13 (Oncology Sciences): shared interest exists in the area of angiogenesis. Where studies focus on developmentally related processes or reactivation of embryonic processes they would most appropriately be assigned to CDD.

- IRG 14 (Hematology): shared interest may exist concerning common stem cell precursors of the endothelial and hematopoetic cell types. While studies of multipotent or bipotent stem cells should be reviewed in CDD, hematopoetic differentiation would be more appropriate to the Hematology IRG. Assignment of applications on the transdifferentiation of cells between the blood and endothelial cell types should be resolved in the direction of the final phenotype.

Cardiac Contractility, Hypertrophy, & Function (CCHF)

The Cardiac Contractility, Hypertrophy, and Function (CCHF) Study Section reviews applications involving both basic and applied aspects of the heart that focus on contractile function and dysfunction, including studies of hereditary and acquired cardiac hypertrophy and failure, at levels ranging from molecular assemblies to the intact organ.

Specific areas covered by CCHF:

- Cardiac hypertrophy and adaptation to abnormal hemodynamic load; mechanical signal transduction, genetic myopathies (hypertrophic, dilated, and metabolic), autocrine/paracrine factors; apoptosis; cell cycle factors; aging inflammatory/cytokine-mediated processes; transcriptional pathways in heart failure; capillary density; transition from compensated to uncompensated state
- Systolic and diastolic dysfunction and heart failure, including: molecular and cellular mechanisms of heart failure; remodeling and extracellular matrix reorganization; capillary density; metabolic adaptations; myocyte energetics; aging
- The cytoskeleton including biochemistry, transport functions, molecular biology and biophysical aspects of myocyte and ventricular mechanics
- Genomic and proteomic approaches to cardiac hypertrophy and failure including expression profiling and functional consequences of the changes; genotype-phenotype correlation in human and model organisms
- Studies of cardiac repair including cell-based therapy
- Neurohumoral and receptor mechanisms as they relate to hypertrophy and heart failure including adrenoreceptors, cytokines and growth factor receptors
- Studies of cardiac myocyte contractile function including sarcomeric proteins, isoforms of these proteins; structural elements in normal and disease states, calcium-force relationship; structure-function relationship of sarcomeric proteins
- Ventricular mechanics; stress-strain relationships; tissue mechanics and constitutive properties of myocardium; myofiber orientation; fibrosis; assessment of the effects of therapeutic interventions such as pacing, ventricular assist devises and others
- Calcium regulation, signaling as it relates to contractility, diastolic function and relaxation
- Receptor and post-receptor signaling for control of myocyte growth, remodeling and contractility
- Valvular heart disease with or without hemodynamic dysfunction
- Arrythmia-related causes of remodeling and heart failure
- Acute and chronic changes in ventricular and cellular function that result from heart transplantation.

Shared Interests Within the CVS IRG:

There is a shared interest in heart failure signaling, arrhythmias and transplantation with other Study Sections in this IRG. Specific overlaps may occur with applications addressing:

- Arrhythmias. When arrhythmias are studied as an etiology of heart failure and myocardial remodeling, including therapeutic effects of pacing on ventricular hemodynamics, the application is appropriately reviewed by CCHF. The study of arrhythmias occurring as a consequence of heart failure and other arrhythmia related studies should reviewed by Electrical Signaling, Ion Transport and Arrhythmias Study Section.

- Transplantation. When transplantation is studied only in relation to assessment of myocardial function, applications may be reviewed by CCHF. All other aspects of transplantation biology including transplant related arrhythmias, graft vasculopathy, atherosclerosis, organ preservation, and transplant immunobiology are more appropriately reviewed by the Atherosclerosis and Inflammation of the Cardiovascular System or Myocardial Ischemia and Metabolism Study Sections.

- Calcium regulation and signaling. Applications addressing calcium regulation and receptor-mediated effects restricted to myocyte growth signaling, contractility, apoptosis, remodeling are appropriate for review by CCHF.

- Cell based therapy (stem cell therapy) as it relates to cardiac repair or heart failure is appropriate for review by CCHF.

- The Myocardial Ischemia and Metabolism Study Section more appropriately review metabolic studies relating to ischemia-reperfusion and arrhythmias.

- Renin/angiotensin as it relates to cellular growth are appropriate for review by CCHF.

- Clinical, population, and integrative studies may be more appropriately reviewed by the Clinical and Integrative Cardiovascular Sciences Study Section.

Shared Interests Outside of the CVS IRG:

- IRG 5 (Biology of Development and Aging): Studies of aging as it relates to effects on ventricular mechanics, myocyte function (systolic and diastolic), genetic adaptations affecting contractile function, and apoptosis may be reviewed by CCHF.

- IRG 12 (AIDS and Related Research): Potential overlap exists with AIDS and abnormal protein mediated cardiomyopathy. Studies relating to myocyte structure-function, myocardial remodeling, and ventricular function may be reviewed by CCHF.

- IRG 16 (Endocrinology, Metabolism and Reproductive Sciences): Studies relating to cardiac metabolism as a chronic adaptation in cardiac hypertrophy and heart failure may be reviewed in CCHF.

- IRG 21 (Surgery, Applied Imaging and Applied Bioengineering): There is significant overlap with the boundary of IRG 21. Areas such as organ preservation and graft rejection related arrhythmias may be appropriately reviewed by IRG 21.

Electrical Signaling, Ion Transport, and Arrhythmias (ESTA)

The Electrical Signaling, Ion Transport, and Arrhythmias (ESTA) Study Section will examine both basic and clinical applications related to cardiac and vascular electrical activity, excitation-contraction coupling, and related signaling. This Study Section reviews applications that address the occurrence, cause, and treatment of cardiac and vascular electrical and electromechanical dysfunction, arrhythmias, and sudden death. Also covered are:

(1) Studies of the basis of electrical activity, ion flux and cell volume regulation in cardiac myocytes and vascular cells;

(2) Regulation of these functions by signaling systems, including intracellular calcium;

(3) Identification of therapeutic targets for abnormalities of electrical activity, ion flux and cell volume regulation in cardiac myocytes and vascular cells; and

(4) Evaluation of mechanisms and outcomes of therapeutic interventions for these abnormalities.

Studies may involve animals and humans, *in vitro* and *in vivo* systems, and computational approaches. Where appropriate, studies will be considered that examine the effects of aging on arrhythmias, calcium homeostasis, and excitability.

Specific areas covered by ESTA:

- Structure-function of ion channels in membranes (cell surface and sarcoplasmic reticulum).
- Biophysical and other approaches to study the function of individual protein molecules.
- Regulation of expression and function of molecules that determine electrical activity, including their transcriptional regulation, post-translational modifications, assembly, trafficking, and anchoring.
- Basis of propagation and repolarization in normal and diseased hearts, including studies of specialized conduction systems and molecules such as connexins involved in cell-cell communication.
- Functional consequences of disease-associated mutations in ion channel and other genes that result in arrhythmias and vascular cell dysfunction.
- Identification of novel genes and proteins that modulate cardiac and vascular electrical activity, excitation-contraction coupling, and related signaling.
- Altered electrical behavior in acquired heart disease; *e.g.* remodeling related to arrhythmias, heart failure, hypertrophy, or ischemia.
- Intracellular calcium homeostasis (uptake and release mechanisms) and its role in calcium-related arrhythmias, and cardiac and VSM contractility.
- Calcium regulation of receptors, channels, transporters, and other calcium-sensitive proteins.
- Excitation-contraction and electromechanical coupling.
- Mediators and modulators of EC coupling, basis of action of individual components of EC coupling.
- Predictors of arrhythmias, including electrocardiography, body surface mapping, intracardiac recordings, signal averaging, and others.

- Computational techniques to model individual channel activity in cellular and multicellular preparations, including the whole heart.
- Technique and device development for treatment of heart rhythm disorders.
- Evaluation of devices that are used in diagnosis and therapy of cardiac rhythm disorders.
- Identification and evaluation of pharmacologic and non-pharmacologic antiarrhythmic interventions

Shared Interests Within the CVS IRG:

There is a shared interest in ion transfer and transport mechanisms affecting electrical activity and EC-coupling as a common endpoint for pathological conditions, with other Study Sections in this IRG. Applications that deal specifically with cardiac and vascular electrical activity, excitation-contraction coupling and related signaling, and electrophysiologic aspects of disease processes will most properly be reviewed in the ESTA Study Section. Specific overlaps may occur with:

- Arrhythmias. ESTA will review applications that focus primarily on ion-movement, calcium homeostasis, and arrhythmias in hypertrophy, heart failure, ischemia, and transplant. Applications with a primary focus on modification of proteins involved in excitability by activation of signaling pathways in these conditions will be reviewed in ESTA. Studies using arrhythmia assessment only as a measure of ischemia or other dysfunction should be reviewed elsewhere.
- Altered electrical activity on vascular function. Applications dealing with the electrical consequences of hypertension, receptors, renin-angiotensin system in the heart and vasculature will be reviewed by ESTA. Applications studying the consequences of altered electrical activity on vascular function may be evaluated elsewhere.
- Clinical studies. Applications that deal with the mechanism of arrhythmogenesis are the purview of ESTA, while the Clinical and Integrative Cardiovascular Sciences Study Section may more appropriately review those that are outcome-based.
- Development. ESTA will review those applications that deal with congenital and acquired arrhythmia syndromes and other ion movement abnormalities, while studies focusing on development of electrically active cells will be reviewed in Cardiovascular Differentiation and Development Study Section.

Shared Interests Outside of the CVS IRG:

- IRG 1 (Biological Chemistry and Macromolecular Biophysics): Studies focusing on molecules involved in cardiac and vascular electrical activity, excitation-contraction coupling, and related signaling will be reviewed in ESTA, whereas those developing methods or using these molecules simply as reagents will be reviewed in IRG 1.
- IRG 2 (Molecular Approaches to Gene Function): Studies that propose genomic or proteomic approaches to identification of genes or pathways involved in altered electrical or electromechanical function in the cardiovascular system should be reviewed in ESTA.
- IRG 3 (Molecular Approaches to Cell Function and Interactions): Studies using molecular approaches to evaluate electrical and electromechanical functions and interactions in the cardiovascular system should be reviewed in ESTA.

- IRG 4 (Fundamental Genetics and Population Biology): Studies focusing on genetic and genomic approaches to identification and characterization of genes involved in electrical and electromechanical function in the cardiovascular system should be reviewed in ESTA.

- IRG 5 (Biology of Development and Aging): Applications focusing on the effects of aging on cardiovascular electrical activity should be reviewed in ESTA.

- IRG 6 (Fundamental Bioengineering and Technology Development): Applications to develop fundamental bioengineering methods should be reviewed in IRG 6, whereas those proposing development and validation of methods focusing on evaluation of cardiac and vascular electrical activity, excitation-contraction coupling, and related signaling should be reviewed in ESTA.

- IRG 8 (Risk, Prevention, and Health Behavior): Studies of predictors of arrhythmic risk should be reviewed in ESTA.

- IRG 14 (Hematology), IRG19 (Pulmonary Sciences), and IRG 20 (Renal and Urological Sciences): Studies that examine arrhythmias due to administration of therapeutic agents may be reviewed in ESTA.

- IRG 19 (Pulmonary Sciences): Studies of the electrophysiology of pulmonary vasculature should be reviewed in ESTA while studies of the consequences of altered electrical behavior in the pulmonary circulation should be reviewed in this IRG.

- IRG 21 (Surgery, Applied Imaging, and Applied Bioengineering): Applications to develop fundamental imaging methods may be reviewed in IRG 21, whereas those proposing development and validation of methods focusing on evaluation of cardiovascular electrical activity should be reviewed in ESTA.

Vascular Cell and Molecular Biology Study Section (VCMB)

The Vascular Cell and Molecular Biology (VCMB) Study Section reviews applications involving the cell and molecular biology of blood vessels ranging from major arteries to the microcirculation. Studies using cellular, biochemical, biophysical, immunological, genetic, pharmacological, and molecular biological approaches to define vascular homeostasis and dysfunction are reviewed. A principal focus is on the biology of the endothelium, vascular smooth muscle cell, as well as adventitial cells and pericytes.

Specific areas covered by VCMB:

- Vascular homeostasis: growth control; apoptosis; cell differentiation; senescence; extracellular matrix; receptor biology; electrophysiology; signaling pathways; intercellular communication.
- Transcription and gene regulation: transcription factors; promoter analyses; genomics; microarrays; bioinformatics; gene clustering.
- Protein biochemistry: protein-protein interactions; protein structure; structural biology; proteomics.
- Vasomotor activity: vasocontraction and relaxation; nitric oxide; archidonic acid metabolites; endothelins; reactive oxygen and nitrogen species; Endothelial-Derived Hyperpolarizing Factor(s).
- Leukocyte trafficking in vascular homeostasis: leukocyte rolling and trafficking; adhesion molecules; chemokines; intercellular signaling.
- Injury/repair: remodeling; angioplasty; restenosis; grafts; stents; re-endothelialization; stem cells; novel interventional therapies.
- Mechanotransduction: hemodynamic forces; stress/strain; force transmission coupling in cells; mechanosignaling.
- Endothelial barrier function: permeability and transport; permeability factors; cell junctions; transmigration; extracellular matrix-mediated signaling; reactive oxygen and nitrogen species.
- Vascular contribution and response to coagulation: thrombosis and fibrinolysis mechanisms mediated by the vascular cells; platelet-endothelial interactions; tissue factor.
- Cellular dynamics through imaging: 3-D imaging; fluorescent fusion proteins; cytoskeleton; organelle dynamics; vesicular traffic.

Shared Interests Within the CVS IRG:

There is a shared interest in the elements of vascular cell biology with other Study Sections in this IRG. Specific overlaps may occur with:

- Electrophysiology, calcium homeostasis, and ion channels. VCMB reviews those applications that emphasize a coupling to vascular cell and molecular biology. Fundamental studies of ion channels or calcium homeostasis without reference to integrated vascular cell function might be more appropriately reviewed by the Electrical Signaling, Ion Transport, and Arrhythmias Study Section.
- Vascular Development. VCMB reviews elements of blood vessel growth and differentiation in postnatal vascular beds. Embryonic growth and differentiation of vessels is more appropriately reviewed by Cardiovascular Differentiation and Development Study Section.

- Microcirculation. VCMB focuses on studies of the microcirculation at the cell and molecular levels. Applications addressing integrated and regional microvasculature function are more appropriately reviewed by the Hypertension and Microcirculation or Clinical and Integrative Cardiovascular Sciences Study Sections.

- Vascular pathology. Studies of atherogenesis or vasculitis are more appropriately reviewed by Atherosclerosis and Inflammation of the Cardiovascular System Study Section.

Shared Interests Outside of the CVS IRG:

- IRG 14 (Hematology): The purview of VCMB are those aspects of coagulation and fibrinolysis that are mediated by the vessel wall cells including both structural and metabolic pro and anti-coagulant properties of the endothelium and smooth muscle that maintain vascular homeostasis and repair of blood vessel injury. For example, local vascular cell expression of coagulation factors as determinants of vessel structure and repair (e.g. PAI-1, uPA, Thrombospondin etc).

Myocardial, Ischemia and Metabolism (MIM)

The Myocardial, Ischemia and Metabolism (MIM) Study Section reviews applications involving basic and applied aspects of myocardial ischemia/reperfusion (regional or global), coronary circulation, and myocardial metabolism. Studies using molecular, genetic, cellular, biochemical, pharmacological, genomic, proteomic, and physiological approaches to define normal and pathological processes and to develop therapeutic strategies are reviewed. MIM examines investigations at all levels of organization, ranging from *in vitro* models of simulated ischemia in isolated cells to whole animal models.

Specific areas covered by MIM:

- Regional and global myocardial ischemia/reperfusion: Mechanisms of ischemia/reperfusion tissue injury, myocardial stunning, infarction, hibernation and the effects of aging.
- Alterations in regional function and flow and perfusion/contraction relations; Post-ischemic coronary vascular abnormalities; Development of collateral circulation in response to ischemia.
- Ischemia-induced changes in gene expression including analysis of DNA arrays including ischemia induced apoptosis.
- Prevention, and treatment of postischemic ventricular remodeling and/or inflammation. Prevention and treatment approaches may include pharmacological, gene therapeutic, preconditioning, stem cell and other cell-based approaches.
- Organ preservation during cardiac surgery including transplantation and during cardiac arrest and resuscitation.
- Signal transduction mechanisms of ischemia/reperfusion injury, preconditioning, and inflammation, including changes in receptor function, kinase activity, and transcription factor activity.
- Pathophysiology and mechanism of myocardial remodeling and/or inflammation in response to ischemia/reperfusion.
- Role of reactive oxygen species, nitric oxide and other reactive nitrogen species, cytokines, chemokines, and white blood cells in myocardial ischemia/reperfusion injury.
- Metabolism and energetics in normal myocardium and in acquired heart disease: carbohydrate and lipid metabolism, glycolysis, oxidative phosphorylation, substrate interaction, regulation of substrate transport and fluxes, mitochondrial function.
- Insulin action and signaling in the myocardium including diabetic cardiomyopathy.
- Regulation of coronary flow in normal and diseased states.

Shared Interests Within the CVS IRG:

There is shared interest in arrhythmias, mediators of inflammation, oxidative stress, nitric oxide biology, signaling, gene regulation, cell-based cardiac repair, and angiogenesis with other Study Sections in this IRG. Assignment to MIM will be on the basis of a primary focus on myocardial ischemia/reperfusion injury and on the repair of its sequelae. Specific overlap may occur with applications dealing with:

- Ventricular remodeling. Studies that examine remodeling following myocardial infarction are appropriately reviewed in MIM.

- Regional Myocardial Function. Applications that examine regional function in relation to ischemia are appropriately reviewed by MIM.

- Signaling molecules. Applications that study inflammation of the myocardium secondary to ischemia and the role of reactive oxygen and nitrogen species, cytokines, and chemokines in myocardial ischemia/reperfusion injury are appropriately reviewed in MIM.

- Clinical, population, and integrative studies. Applications that examine ischemia/reperfusion in the context of focused clinical, population, and integrative studies may be more appropriate for review in Clinical and Integrative Cardiovascular Sciences Study Section. Studies that are appropriately reviewed in MIM focus on the mechanism of myocardial injury and/or myocardial preservation.

Shared Interests Outside of the CVS IRG:

- IRG 21 (Surgery, Applied Imaging, and Applied Bioengineering): studies of myocardial ischemia/reperfusion injury associated with cardiac surgery can be appropriately reviewed either in IRG 21 or in MIM.

- IRGs 22, 23, and 24 (Neuroscience IRGs): Studies of cardiac arrest and resuscitation represent a shared interest. Studies that are appropriately reviewed in MIM focus on the mechanism of myocardial injury and/or myocardial preservation.

Hypertension and Microcirculation Study Section (HM)

The Hypertension and Microcirculation (HM) Study Section reviews applications involving basic and applied aspects of blood pressure regulation with focus on the physiology of blood pressure regulation and pathogenesis of hypertension as well as blood pressure elevation with aging. It includes studies on cell surface receptors and signaling processes, endogenous vasoactive substances, including the renin-angiotensin system, reactive oxygen species, and their mechanisms of action as related to hypertension, regional hemodynamics, lymphatic circulation, and microcirculation.

Specific areas covered by HM:

- Blood pressure regulation and systemic hypertension. Studies may focus on central or peripheral nervous and endocrine systems, and kidneys and address primary regulators of blood pressure or end organ effects. Mechanisms involving regulation of renal hemodynamic, renal tubular transport, or paracrine, autocrine, or intracrine function, and hormonal/humoral agents produced by the kidney (and other organs) such as renin/angiotensin, dopamine, kallikreins, eicosanoids, nitric oxide and reactive oxygen/nitrogen species when the primary focus is on systemic hypertension.

- Molecular/cellular/biochemical/genetic studies of hypertension. Genetic linkage and association studies or candidate genes analyses in humans and animal models of genetic hypertension. Generation of hypertension models by transgenic/knockout and gene transfer approaches, surgical, drug or hormonal intervention and environmental influences. Methodologies in the measurement and recording of blood pressure.

- Regulation and signaling of adrenergic receptors and G-protein coupled receptors, including activation and regulation of the relevant phospholipases, kinases, phosphatases,cyclases, arrestins and other adaptor and effector proteins as related to hypertension, regional and microcirculation, and lymphatic flow.

- Regional measurements of blood flow including cerebral, splanchnic, skin, skeletal muscle, vasa vasorum, and renal vessels (excluding pulmonary circulation, IRG 19). Microcirculatory functions, including rheology, capillary pressure and fluid exchange and nutrient delivery; arteriole/vein/venule and endothelial cell function.

- Mechanotransduction, contractile and mechanical properties of smooth muscles, vascular permeability, autoregulation, response to metabolism, blood-brain barrier. Modulation of flow by nitric oxide, other vasoactive agents, smooth muscles, ion channels, and gap junctions, and modification of flow by gene transfer.

- Lymphatics include functional biology, mechanisms of fluid exchange, propulsion of lymph and lymphatic tone, pathophysiological processes contributing to primary and secondary lymphedema, and treatment of lymphedema.

Shared Interests Within the CVS IRG:

There is a shared interest in neural regulation of blood pressure, reactive oxygen/nitrogen species, receptors, cell biology, and signaling with other Study Sections in this IRG. Specific overlap may occur with applications dealing with:

- Studies that focus on hypertension, regional blood flow, microcirculation, lymphatic flow and function will be reviewed in Hypertension and Microcirculation.
- Coronary circulation will be reviewed in Myocardial Ischemia and Metabolism.
- Patient oriented research on hypertension may be reviewed in Clinical and Integrative Cardiovascular Science.

Shared Interests Outside of the CVS IRG:

- IRG 4 (Fundamental Genetics and Population Biology): studies dealing with mechanisms of blood pressure regulation and hypertension may be reviewed in HM.
- IRG 16 (Endocrinology, Metabolism, and Reproductive Function): Hormonal regulation of blood pressure and microvascular function is shared with IRG 16. Hormonal regulatory mechanisms involving systemic or regional circulation should be reviewed in HM.
- IRG 20 (Renal and Urological Sciences Study Section): Renal hemodynamics, tubular function, and renal humoral/hormonal agents may be reviewed in IRG 20, whereas, these functions as they relate to hypertension should be reviewed in HM. Hypertension associated with renal insufficiency or end-stage renal disease should be reviewed in IRG 20.
- IRG 24 (Brain Disorders and Clinical Neuroscience): studies dealing with cerebral circulation and hemodynamics may be reviewed in HM.

Atherosclerosis and Inflammation of the Cardiovascular System (AICS)

The Atherosclerosis and Inflammation of the Cardiovascular System (AICS) Study Section reviews applications involving both basic and applied science related to aspects of inflammation of the vascular system with a focus on atherosclerosis, diabetes, transplantation, aging, autoimmunity and infection. This Study Section will review applications on the pathobiology of the blood vessels leading to atherogenesis, its reversal and prevention. A major contributor to atherogenesis is hyperlipidemia, affecting lipids, lipoproteins and their oxidation derivatives. Atherosclerosis is a chronic inflammatory disease, thus studies involving inflammatory mediators, cytokines, chemokines, cell signaling, cell migration, and reactive oxygen and nitrogen species of the cardiovascular system are appropriate. Major risk factors such as diabetes will be emphasized at two levels, the generation of hyperlipidemia and responses of the vessel wall.

Specific areas covered by AICS:

- Signaling in the vascular wall; immune mechanisms in vascular inflammation; cytokines, chemokines, cell signaling, reactive oxygen and nitrogen species, influencing the vessel wall; macrophages and T cell activation in the cardiovascular system; transplantation immunology related to cardiovascular disease.
- Reactive oxygen and nitrogen species of LDL and in vascular injury including nitric oxide to form peroxynitrite.
- Hepatic lipoprotein metabolism; structure and function of apolipoproteins, lipid metabolizing enzymes and receptors; gene expression and regulation.
- Reverse lipid transport; apoproteins E and A-I; HDL; cell surface molecules in lipid efflux; ABC transporters.
- Lipoprotein interaction with vascular cells; LDL modification and oxidation; LDL interaction with monocyte-macrophage forming foam cells; LDL interaction with matrix components; vascular cell surface receptors for lipoproteins.
- Genetics of lipoprotein metabolism; genetics of responsiveness of cells and enzymes involved in atherogenesis.
- Therapeutic strategies for hyperlipidemia, inflammation and cholesterol disposal; gene therapy; hormone replacement therapy.
- Animal models of atherosclerosis, diabetes, vasculitis, infection or lipid metabolic disorders (inherited or acquired).
- Stem cells; origin of cells of atherosclerotic plaque and cardiovascular inflammatory foci
- Regression of atherosclerosis; plaque stabilization; metalloproteinases; cell and matrix remodeling.
- Lipid mediators in vascular wall inflammation; arachidonic acid metabolites.
- Pro- and anti-inflammatory mechanisms in vessel wall; nuclear hormone receptors; Peroxisome Proliferator Activated Receptor (PPAR) and Liver X Receptor (LXR); sterol and fatty acid ligands.
- Insulin and diabetes effects on lipoprotein metabolism in the liver; lipid and lipoprotein metabolism influencing hepatic insulin action.

- Insulin action and signaling in the vessel wall; insulin resistance.
- Infective agents in promoting vessel wall inflammation.
- Sepsis, endotoxic shock, endocarditis, viral or autoimmune myocarditis, Chagas disease, rheumatic heart disease transplantation associated infections, and other infections of the cardiovascular system.

Shared Interests Within the CVS IRG:

There is shared interest in the pathobiology of atherosclerosis with other sections in this IRG. Assignment to AICS will be on the basis of a primary focus on atherosclerosis as an inflammatory process and on diabetes. Specific overlap may occur with applications dealing with:

- Vascular biology. Aspects of vascular biology related directly to processes of vascular inflammation; atherogenesis and atherosclerosis regression will be reviewed by AICS. Vascular remodeling related to the refashioning of the atherosclerotic plaque will be reviewed by AICS.
- Hypertenison. Although a well recognized risk factor for atherosclerosis, applications that focus on hypertension may be more appropriately reviewed by Hypertension and Microcirculation.
- Patient-Oriented Research. Applications that focus on genetics and mechanisms involved in the modification of risk factors (such as lipid dysfunction) may be more appropriately reviewed by Clinical and Integrative Cardiovascular Sciences.

Shared Interests Outside of the CVS IRG:

- IRG 8 (Risk Prevention and Health Behavior): AICS should review applications concerned with the biochemical and genetic mechanisms of the modification of risk factors for athersclerosis.
- IRG 10 (Immunology): Studies of the immunology of cardiac transplantation and inflammation of the cardiovascular system as related to atherosclerosis, diabetes, autoimmune myocarditis and other immune-related cardiovascular inflammation would be appropriate for review in AICS.
- IRG 11 (Infectious Diseases and Microbiology): Studies of infectious diseases directly related to cardiovascular system injury and inflammation may be appropriate for AICS.
- IRG 16 (Endocrinology, Metabolism and Reproductive Biology): Studies of the mechanisms of hyperlipidemia and its reversal may be reviewed by AICS. Studies of the adipose tissue should be reviewed in this Study Section if they are related to mechanisms of atherogenic risk factors.
- IRG 18 (Digestive Sciences): Those applications focused on the biochemistry of elevated plasma lipids and lipoproteins in the intestine and liver may be reviewed in AICS.

Clinical and Integrative Cardiovascular Sciences (CICS)

The Clinical and Integrative Cardiovascular Sciences (CICS) Study Section will consider research applications concerned with basic and clinically oriented research, including multiple organ systems ranging from the cell to whole animal/human research involving cardiovascular regulation. Specific areas of interest include exercise, neural control, patient oriented studies and prevention. Patient oriented research is defined as studies involving investigation of the cardiovascular system of humans, including autonomic physiology and exercise cardiovascular studies. Applications are generally characterized by the inclusions of appropriate biostatistical support.

Specific areas covered by CICS:

- Human studies ranging from exercise and neural control to clinical studies of mechanisms and consequences of disease. Investigations may include coronary physiology and pharmacology, cardiac electrophysiology, regional circulations, hemodynamic studies, cardiac mechanics and cardiovascular genetic studies. Disease states can include cardiac or vascular ischemia, hypertension, diabetes, thyroid disease, atherosclerosis or hypercholesterolemia.

- Environmental stresses. Smoking, altitude, heat, cold, environmental pollution in patients ranging from childhood to adolescent, adult, pregnancy and aging.

- Allopathic and alternative or complementary therapies. Large multicenter clinical trials and surveys or studies confined to tissue analysis are excluded.

- Exercise. Both acute responses and training adaptations are included. Human and animal models investigating the influence of exercise on cardiac, vascular, heart muscle, neural, humoral, and regional circulations may be included.

- Modulation of cardiovascular responses and adaptations by disease and environment. Disorders, such as atherosclerosis, diabetes, ischemia, hypertension, environmental or modifying conditions, and stimuli, such as microgravity, smoking, pollutants, altitude, bed rest, aging, neonatal, maternal and deconditioning, among others, are included.

- Neural control of the cardiovascular system in health and disease. This includes autonomic physiology involving all aspects of reflex arcs (including afferent, central neural integration and efferent/effector organ. Mechanisms of afferent activation of mechano- and chemosensitive sensory endings. Central mechanisms, including anatomy, physiology, pharmacology and receptor mechanisms from the organ to subcellular elements, including gene expression, interactions between brain stem and higher brain areas for long and short loop reflexes, and efferent or autonomic regulation.

- Study of Prevention. This includes modification of cardiovascular risk factors that potentially influence cardiovascular function and neural control of cardiovascular function. Examples could include alterations of glycemic state, blood pressure or lipids or cessation of smoking on cardiovascular function. Pharmacological, dietary and lifestyle modifications of these risk factors are included. Conventional, alternative or complementary therapies will be reviewed.

Shared Interests Within the CVS IRG:

There is a shared interest in the study of clinical cardiovascular physiology and pathology with other Study Sections in this IRG. Specific overlaps may occur with

- Disease-oriented studies. Applications investigating arrhythmias, myocardial and peripheral vascular ischemia, hypertension, inflammation and infection, thrombosis, congenital heart disease, valvular heart disease, atherosclerosis and thrombosis/clotting that predominately involve human subjects, both normal and diseased, should be reviewed in CICS.

- Myocardial mechanics and metabolism. Specific systems including myocardial mechanics and metabolism should be reviewed in CICS if they involve strictly human investigation (not only tissue) or if multiple organ systems, particularly the nervous and cardiovascular systems, are involved.

- Clinical trials. Large clinical trials that focus on outcomes may be reviewed in CICS. Applications involving randomized multi-center clinical trials are not appropriate for this Study Section. Clinical trials of small numbers of patients that investigate mechanisms involving particular expertise on other Study Sections within the IRG may be reviewed in these Study Sections. For example, studies of polygenic cardiovascular diseases may be reviewed in the CICS, while monogenic studies may be reviewed in one of the other cardiovascular sciences Study Sections.

Shared Interests Outside of the CVS IRG:

- IRG 5 (Development and Aging), IRG 7 (Health of the Population), IRG 8 (Risk, Prevention and Health Behavior), IRG 14 (Hematology), IRG 16 (Endocrinology, Metabolism and Reproductive Sciences), IRG 19 (Pulmonary Sciences), IRG 20 (Renal and Urological Sciences), and IRG 23 (Integrative, Functional and Cognitive Neurosciences): When the primary emphasis of clinical studies is on the cardiovascular system, including its response to neural control, applications may be reviewed by CICS.

- IRG 17 (Musculoskeletal, Oral and Skin Sciences): Studies of exercise and exercise training that influences multiple organ systems, including the cardiovascular, neural, hormonal, respiratory and cutaneous systems, among others, should be reviewed by CICS when the cardiovascular system is the primary focus of the research.

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